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Botanical Medicine Monographs and Sundry

IRISH MOSS AS A SUBSTITUTE FOR GUM ACACIA IN PHARMACY.

BY PETER BOA.

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At the present time when the price of gum arabic is about five times what used to be considered its normal value it seems not inappropriate to introduce for consideration a subject such as I have to bring before you tonight. A mucilage of Irish moss, prepared by boiling in water, has been largely used in America for the emulsification of cod liver oil, but so far as I have been able to ascertain by liberal reference to journals published in that country and in this, its more extended pharmaceutical use has not been proposed.

Some years ago I made experiments with the moss mucilage as an emulsifier of cod liver oil, but my experience with it did not indicate any evidence of its superiority to other substances used for the same purpose, such as acacia and tragacanth. In consequence I abandoned further consideration of it, especially as the cost was not then an element of so urgent importance as it is now.

A few months since, however, in conversation with a pharmaceutical friend, the subject of a substitute for acacia came up. Remembering my previous experiments with Irish moss I thought this substance might possess some qualities which would make it worth considering with this object in view. Since then I have from time to time as leisure permitted gone into the subject, and the results of my experiments, so far as they appear to me to be worth recording, I propose to lay before you.

The only two British species of algae which yield a mucilaginous jelly with water are *Gelidium corneum* and *Chondrus crispus*, or Irish moss. The latter is the more plentiful, and being a well-known article of commerce is easily obtainable. The composition of commercial Irish moss is given by Church as

Water	18.8
Albuminoids	9.4
Mucilage	55.4
Cellulose	2.2
Mineral matter	14.2
	100.0

Stanford says it yielded him 63.7 per cent. of carragheenin, or vegetable jelly; this probably includes the albuminoids and mucilage given in Church's analysis.

The mucilage may be obtained by boiling, by heating on a waterbath, and by cold maceration. The usual method is boiling. However, having put a quantity of the moss into water to soak one afternoon, and being unable to attend to it till the next day, I found when I examined it that the water was distinctly viscous. By putting a larger quantity of moss into a smaller quantity of water, and macerating with occasional gentle stirring for twenty-four hours, I obtained a mucilage of about three-fourths the viscosity of acacia mucilage.

At the commencement I encountered a difficulty which threatened to be a serious objection. I found it exceedingly troublesome to get the mucilage clear, the insoluble particles suspended in it being so minute that the straining medium necessary to exclude them required to be so fine that the mucilage would scarcely pass through it. Mr. Huested (*Pharm. Journ.*, July 16,1881, p. 49) records similar experience. In a case where the small particles in suspension would not be objectionable, a fairly presentable product may be obtained by using muslin or calico as the straining material, and gently stirring or pressing. For emulsions this serves admirably. In a clear mixture, however, the particles become objectionably evident when the mucilage is diluted. To obtain a clear preparation Mr. Huested recommends that the mucilage while hot should be poured into a flannel filteringbag and allowed to drain through, no pressure or stirring being employed. Proceeding in a similar way I failed to get satisfactory results. I could neither get the mucilage to run through reasonably rapidly nor obtain it so clear as I desired. It may be that Mr. Huested's manipulation is superior to mine, or his mucilage was not so clear as that which I have now succeeded in preparing. After many failures, the details of which I need not give, I found that by using a hot water funnel and straining the mucilage through absorbent cotton wool supported on muslin, a preparation clear enough for all but exceptional purposes could be obtained with comparatively little difficulty. If a perfectly water-clear preparation be required, it may be obtained by making a weak mucilage, filtering it clear, and then evaporating to the thickness required. If a clear jelly were wanted this would be the only way to prepare it, because a decoction of this consistence could not be strained, even when kept hot, in anything like a reasonable time, if at all.

A quarter of an ounce of moss, washed free from dust and sand, soaked in 24 ozs. of cold water for an hour or so, boiled gently for five minutes or heated on a water-bath for double the time, and strained in the manner I have described, yields about 18 ozs. of mucilage closely resembling in appearance and viscosity the acacia preparation, and possessing as little taste.

I have observed that the clear mucilage has less taste,—"flavor" perhaps I should say,—than that which has not been freed from insoluble particles.

A quarter of an ounce macerated in 4 ozs. of cold water for twentyfour hours, or longer, gives a mucilage such as that to which I have already made reference.

Specimens of these and of some other strengths are on the table. I have observed

variations in the results from different parcels of the moss.

Comparing the moss mucilage with acacia mucilage in combinations, I find that it serves as well as the latter for chalk mixture. Guaiac. mixture made with it does not soon acquire a greenish tinge as that made with acacia: oxidation appears to be retarded and presumably the moss is therefore to be preferred. For suspending copaiba it is superior to acacia, separation taking place much more slowly and less

completely. Part of the copaiba remains in an emulsified state at the bottom of the bottle when moss is used, but with acacia the liquid in the lower part of the bottle is free from anything of that kind, all the oleoresin having risen to the top.

For emulsifying cod liver oil it is greatly superior to acacia in point of preventing separation, but a finer division of the oil can be obtained by the use of acacia in greater proportion than the equivalent.

Moss mucilage, 5 drams, cod liver oil, 1 fluid ounce., and water 2 fluid ounces, produce an emulsion that is practicably inseparable. Using 5 drams acacia mucilage, 1 fluid ounce cod liver oil, and 2 fluid ounces water, the product obtained quickly separates.

It should not be used for suspending heavy powders without some caution, for I find that when it is employed to suspend subnitrate of bismuth, the bismuth when once it settles down will not again shake up. Where there is no objection of this kind it is superior to ordinary mucilage.

Specimens are shown illustrative of the results of these comparative experiments.

In regard to compatibility moss mucilage forms a clear jelly with subacetate of lead solution; it is miscible with rectified spirit and dilute nitric acid; perchloride of iron gives a slight gelatinous precipitate.

The preparation keeps good for some weeks in full bottles without any preservative. One specimen is shown that has been kept in a partially filled bottle in the front shop for two months and it can hardly be said to be bad; other specimens, however, of about the same age have become mouldy on the top. It does not sour like acacia mucilage.

Pereira says that *Chondrus crispus* has a popular reputation for pulmonary complaints, chronic diarrhoea and irritation of the kidneys and bladder. The mucilage strikes one as being well suited for use with medicines for any of these complaints; a few ounces of it in a cough mixture, for example. It may be used freely, for it is readily digested-the melting point of the jelly being 80º F., not much above that of isinglass jelly used for invalids.

PHARMACEUTICAL NOTES.

(Abstracts from Theses)

Fluid extract of scutellaria, as seen in the shops usually has a certain amount of precipitate. Edward Pennock, Ph. G., states that the formation of this precipitate may be prevented or considerably lessened by using a menstruum containing 5 per cent. of glycerin; the percentage of alcohol is not stated.

Distilled water of witchhazel.—John Keifer, Ph. G., obtained from a large distiller in Connecticut particulars as to the manufacture of the distillate, of which the following is an outline: The twigs of hamamelis are collected with the buds in the fall and early winter, are cut into pieces from 6 to 12 inches in length, and then distilled from. copper stills in the presence of water, and usually by means of steam. The first portion of the distillate is milky, subsequently it is clear. About a ton of twigs is used to produce one barrel of distillate to which is added from 5 to 7 gallons of alcohol as a preservative, a pound of the finished product representing from 6 to 8 pounds of twigs. This so-called distilled extract is clear, colorless, entirely volatile and has a somewhat pungent aromatic odor.

Myrrh-gum has been experimented with by H. E. Emerson, Ph. G. The residue of myrrh left after the preparation of the tincture, was washed with alcohol, and dried, and subsequently dissolved in one, two and four parts of water. After straining the yellowish opaque mucilage its adhesive properties were tried and found to be rather superior to gum arabic, since it causes labels to adhere tightly to glass, wood, tin, etc. Though its want of transparency detracts somewhat from its usefulness, it has the advantage of keeping unaltered for a long time.

The results corroborate those of E. B. Shuttleworth (AM. JOUR. PHAR., 1871 p. 369) and C. E. Escott (ibid., 1887 p. 69). Mr. Shuttleworth suggested the addition of a little molasses to the mucilage to increase its adhesive properties.

Rhus glabra.—A good ink may be prepared from sumach leaves, according to Oscar J. Lache, Ph.G. A decoction is prepared by boiling 1 oz. of the bruised leaves for half an hour in one pint of water, and straining; 90 grains of sulphate of iron, and 60 grains of gum arabic are added. The ink has at first a brownish cast which disappears in a few days; after about two weeks it can scarcely be distinguished from ink made from nutgalls.

On evaporating an infusion of the berries hard crystals of calcium acid malate are obtained, having a red brown color; by repeated re-crystallization they may be obtained clear and transparent They are decidedly acid, and are with difficulty dissolved in cold water. The acid, was prepared by Procter's process (see U. S. Disp.) On precipitating the solution of the calcium salt with acetate of lead, and decomposing the precipitate with sulphuretted hydrogen, a filtrate is obtained, which on evaporation, yields prismatic crystals of malic acid. The yield is fro. 3 to 4 per cent.

ANALYSIS OF THE LEAVES OF TUSSILAGO FARFARA, Lin.

By CHARLES S. BONDURANT, Ph G.
(From an Inaugural Essay).

The leaves were carefully freed from the long petioles and other extraneous matter. On account of their tomentose character considerable trouble was experienced in reducing them to No. 80 powder. Moisture determined in a portion of the air-dried drug amounted to 7-8 per cent. This may include a small percentage of volatile oil which was also present.

Fifty grams (50 gm.) were taken for analysis. Complete exhaustion with petroleum spirit yielded 2.18 per cent solid matter at 100º C. On increasing the temperature to 110º C. an acrid volatile oil was driven off in small quantity. The residue after driving off volatile oil, yielded nothing to distilled water. Boiled with absolute alcohol, the solution, on cooling, deposited a small amount of waxy matter of low melting point. Caustic potash was added to the alcoholic solution and after boiling, diluting and acidifying, a small portion separated insoluble in water, showing presence of a small amount of resinous matter. That portion of the petroleum extract, insoluble in absolute alcohol, was caoutchouc, soluble in chloroform, bisulphide carbon and ether, not saponified with strong solution of potassa.

The residue of the original 50 gm. was next macerated with stronger ether until exhausted with that solvent, which extracted 2.63 per cent. solid matter sparingly soluble in distilled water, to which it imparted an intense bitter taste. This aqueous solution contained no tannin, and gave no reaction for alkaloids, but was found to readily reduce Fehling's solution after boiling with dilute hydrochloric acid and neutralizing, thus giving evidence of a glucoside. After evaporating this aqueous solution on a water bath to a small bulk and placing this over sulphuric acid for several days, a white amorphous solid had separated, quite bitter and inodorous, but on boiling with dilute sulphuric acid, a strong odor, similar to that of wetted leather, was evolved. Thus decomposed and neutralized, the liquid reduced Fehling's solution.

That portion of the ethereal extract insoluble in water was treated with hot absolute alcohol which failed to dissolve the whole of the residue. The alcoholic solution filtered and poured into a large quantity of acidulated water, separated a dark brown-reddish resin, which, on drying became brittle, dark red with concentrated sulphuric acid, whitish on the addition of water, and was soluble in concentrated solution of caustic potash. That portion insoluble in boiling absolute alcohol was found to be caoutchouc which had escaped extraction with petroleum spirit.

The residue after exhaustion with stronger ether was macerated for 24 hours with absolute alcohol and filtered. On evaporation an extract remained which amounted to 3.28 per cent., the greater portion of which was soluble in distilled water. The aqueous solution was free from alkaloids, with ferric chloride showed evidences of tannin, and with neutral lead acetate yielded a precipitate containing 2.64 per cent. of organic matter, while gelatin and alum precipitated 2.42 per cent., the difference being probably gallic acid.

The small portion not dissolved by distilled water from the alcoholic extract was found to be resinous and similar in character to that obtained in the ethereal extract.

The petroleum spirits, ethereal and alcoholic extracts were strongly colored green by the chlorophyll present in the leaves. The solutions were distinctly green by transmitted and dark red by reflected light.

The residue from the alcoholic treatment was dried and macerated with distilled water during 24 hours, then filtered and made up to known volume by passing distilled water through the filter. The extracted matter amounted to 11.22 per cent. The aqueous solution, treated with 2 vols. of absolute alcohol precipitated 3.42 per cent. of mucilage; the filtrate concentrated and treated with 4 vols. of absolute alcohol deposited 6.23 per cent. of dextrin and allied carbohydrates, and the filtrate from this on evaporation yielded saponin, insoluble in absolute alcohol, soluble in chloroform, turning purple with concentrated sulphuric acid and yielding frothing solutions with water.

The residue of the powdered leaves left after treatment with water was next treated with a 0.2 per cent. solution of caustic soda, the filtrate slightly acidified with acetic acid, and mixed with 3 volumes of 95 per cent. alcohol; the precipitate was dried at 100º C., weighed, incinerated, and after deducting the ash, gave 6.21 per cent. albuminous matter present.

The residue of the leaves not dissolved by caustic soda was treated with dilute hydrochloric acid, the filtrate neutralized with ammonia, the precipitate dried, and incinerated to calcium oxide, and calculated to calcium oxalate, amounting to 1.26 per cent.

The residue of the 50 gm. of powder, on being treated with distilled water and chlorine gas, lost 19.42 per cent. of lignin and incrusting substances, the dried residue of 28.43 per cent. constituting cellulose.

A qualitative examination was made of the ash weighing 17.10 per cent. of the powdered leaves; it contained potassium, calcium, magnesium, iron and aluminium, chlorides, phosphates, carbonates and silicates.

GLEANINGS IN MATERIA MEDICA.

BY THE EDITOR.

Digitalin, according to Ph. Lafon, (Archives de Phar. 1887, p. 32), is not altered by diastase, pepsin, gastric juice, pancreatic juice, bile, yeast, emulsin or in contact with putrefying substances, and therefore, cannot be altered in the digestive canal ; but after it has entered the circulation it appears to be oxidized. Alkalies and mineral acids, with the exception of nitric acid, do not interfere with the detection of digitalin but this is destroyed by nitric acid.

Cannabis indica has been experimented with by Dr. J. Roux, (Archives d. Phar. 1887 p. 1) the preparations having been made by Duquesnel. The drug was exhausted with alcohol, and the alcoholic extract was freed from matters soluble in water which were inert; the remaining green mass was then treated with petroleum benzin and with ether. Of the three extracts thus obtained, that made with ether produced insignificant results. The petroleum extract was found to be excitant and convulsivant, and in the dose of a gram produced coma and in 11 or 12 hours death of the animal. The alcoholic extract has narcotic properties, but its action is uncertain, if small doses are given.

Formation of solanine in potatoes.—Thus far, this alkaloid has been obtained only from potatoes while unripe or during the time of sprouting. Dr. Geo. Kassner, of Breslau, reports (*Zeitschr. f. Nahrungs Unt. u. Hygiene*, 1887, p. 22,) that he succeeded in proving its presence and isolating weighable quantities from potatoes which had been injured, and had afterwards been kept for some time in a cellar. In such eases the wound becomes covered with a kind of scurf, beneath which dark colored spots and stripes are usually observed in the white tissue, and the potato has generally a disagreeable taste. It has not been ascertained whether under this circumstance the presence of solanine is due to the vital functions of the tuber, as is the case while sprouting, or whether it must be referred to the action of the fungoid mycelium appearing upon the wound, and regarded as a decomposition product of the nitrogenated constituents of the potato. It would be of interest to ascertain whether the different varieties of cultivated potatoes will always generate solanine under the conditions mentioned above.

Commercial Jalapin has been examined by Edmund White, (*Phar. Jour. and Trans.*, Feb. 12, 1887, p. 651,) who found seven samples to contain between 3.5 and 7.3 per cent. of ether-soluble resin, while an eighth sample was completely soluble in ether, and was probably derived from Tampico jalap. The moisture present in the samples which were in powder and nearly white, amounted to between 2 and 5 per cent., and the alcohol-soluble resin, between 87.8 and 94.8 per cent.

Commercial jalap resin was likewise examined, six samples yielding the following results :

7.8 sol. in ether,	88.2 sol. in alcohol,	trace sol. in water.
7.2	99.2	none
8.4	72.4	16.6
77.8	16.6	3.1
25.6	72.0	trace
46.0	50.4	none

The ether-soluble resins were in all cases plastic and tenacious. Only two of the six resins correspond to the requirements of the pharmacopceia.

Valeriana Hardwickii, *Wallich*.-An analysis has been made of the rhizome of this East Indian plant, by J. Lindenberg (Dorpat Pamphl.-Phar. Zeits. Russl. 1886), and compared with one of Val. officinalis, Lin. The direct determination of valerianic acid, total albuminoids, and total water soluble substances gave for the former 1.37, 11-06 and 28-59 per cent. respectively, and for the officinal drug 1.21, 9.38 and 24.88 per

cent. The results of the quantitative analysis were:

	V. Hardw.	V. officin.
Moisture	10.46	11.57
Ash	4.04	4.31
Fat and resin, soluble in petroleum-benzin	0.56	0.36
Volatile oil and valeric acid, sol. in benzin	1.005	0.90
Volatile acid soluble in ether	0.335	0.31
Resin and wax soluble in ether	0.56	0.85
Resin soluble in alcohol	1.05	0.975
Tannin	3.13	1.64
Citric, tartaric and other acids .	0.335	0.566
Glucose	6.03	5.32
Other substances, sol. in water, insol. in alc.	14.96	14.39
Mucilage and albumin sol. in water	4.16	2.97
Albuminoids extracted by soda	9.72	7.83
Metarabic acid,phlobaphene and albuminoids	19.10	16.70
Starch	14.05	12.87
Cellulose	10.36	11.65
Lignin and other compounds	10.015	16.80

Butea frondosa, Roxburgh.-The seeds have been analyzed by Nikolai Waeber, (Dorpat Pamph.-Phar. Zeits. Russl. 1886.) The seeds are flat about 1/2 inch long, 1 inch broad and inch thick; testa dark reddish brown, veined; hilum projecting; cotyledons broad, leafy, veined; radicle small; taste somewhat bitter. Alkaloids and glucosides were not found. The results of the analysis were: moisture, 6.62 ; ash, 5.14; fat, 18.20, wax soluble in ether, 0.25; albuminoids soluble in water, 9.12, soluble in soda, 1.95, and insoluble in water and soda, 8.49 ; substance apparently nitrogenated, soluble in alcohol, 0.82 ; mucilage, 2.28; glucose, 6.87 ; organic acids, 4.00 ; other substances soluble in water, 2.16; metarabic acid and phlobaphen 10.10; cellulose, 3.80, and other insoluble substance, 22.20 per cent.

Ulexine.-The alkaloid discovered by Gerrard in Ulex europaeus, Lin., has been experimented with by Dr. Pinet (Arch. Physiol., 1887.) It produces convulsions resembling those following nicotine, then sleepiness and cessation of respiration ; it appears to affect the nervous, but not the muscular system. It is not an antidote to strychnine, its effects being rapidly produced, but not lasting. See also AM. JOUR. PHAR. 1886, p. 491.

Asclepias currasavica, ***A. incarnata*** an, ***Vincetoxicum officinale*** were found by C. Gram (*Chem. Centr.* 1886, p. 735) to contain a glucoside, asclepiadin which is readily soluble in water, sparingly soluble in alcohol, and is easily converted into the less active asclepin. Harnack's asclepiadin which appears to be identical with Feneulle's asclepin, was obtained from the herbaceous portion of *A. currasavica*. The root of vincetoxicum yielded asclepidin, but no asclepin. Of two commercial resinoids of A. tuberosa that prepared by Parke, Davis & Co. consisted of aselepin with a small quantity of a substance having a tetanic action; while that prepared by Keith & Co. was a mixture, of asclepiadin, asclepin and aselepion, the latter being a constituent of vincetoxicum and of milkweed.

Mutisia viciaefolia, *Cavanilles*.—This plant is stated by Mr. Naudin (*Jour. d'Hygiene*, 1886), on the authority of Dr. Sace of Cochabamba, Bolivia, to enjoy the reputation of curing phthisis and all pulmonary diseases. The plant is indigenous to the western part of South America from Chili to Peru, and belongs to the labiatifloral compositae which are confined chiefly to South America, and the leaves of which are usually mucilaginous, somewhat bitter, and occasionally more or less aromatic. A number of species are locally used as expectorants.

ABSTRACTS FROM THE FRENCH JOURNALS

Translated for the AMERICAN JOURNAL OF PHARMACY

ANEMONE PULSATILLA. In some observations Upon this plant (Gaz. Hebdom., May 27, June 3), P. Vigier adds little to our knowledge of it, but does something negatively for science by making no claim for its medicinal virtues beyond its sedative effect and the fact that, taken internally, it reduced the catarrhal fever of a cold in the head and nearly stopped the nasal secretion. He states that the distillations when bottled and put aside lose their bad odor and acridity and deposit anemonin. Alkalies dissolve it readily, making anemonates. He finds the atomic formula to be $C^{15}H^{12}O^{6}$ [agreeing with Fehling], the anemonic acid having one more equivalent of oxygen. "A curious peculiarity is that hydrochloric acid dissolves the anemonin without altering it, whilst nitric and sulphuric acids destroy it rapidly." He has often taken 10 centigm. of it without toxic effect; 2 to 4 centigm. a day were enough to get the anti-catarrhal effect and that on the nervous system. The leaves lose their properties by dessication; the roots do not, and these possess the medicinal properties of the plant in a much higher degree. They are gathered in June. Equal parts by weight of the root and alcohol at 90 are macerated for fifteen days. The mixture keeps well. The dose is 2 to 4 gm. a day—less than that of the tincture made from the leaves. He proposes a syrup of syr. aurant. flor. 95 gm. and tincture (as above) 5 gm.; two to four gm. daily, in water.